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10/587,137

04/16/2007

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EXAMINER

LOGIE, MICHAEL J

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/587,137 | Applicant(s) FEUERBAUM, HANS-PETER | |
| | Examiner MICHAEL J. LOGIE | Art Unit 2881 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 36 is/are pending in the application.
- 4a) Of the above claim(s) 26-35, 37 and 38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/21/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Species II, claims 1-25 in the reply filed on 04/17/2009 is acknowledged. The traversal is on the ground(s) that "a search of the charged particle beam device of Species II would necessarily include a search for the focussing lens of Species I, and therefore would not be a serious search and examination burden for the Examiner to search claims 1-25 and 36". This is not found persuasive because independent Claim 36 is an obvious variant of independent Claim 1 and would be included into the same species of Claim 1. The preamble of Claims 1 and 36 both recite "A focussing lens for focussing a charged particle beam onto a specimen at a predetermined landing angle" and thus since Applicant elected claims 1-25 encompassed by Species II, claim 36 is considered herein as well.

The requirement is still deemed proper and is therefore made FINAL.

Claim Objections

A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

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Claim 15 objected to because of the following informalities: Claim 15 is missing a period. Appropriate correction is required.

Claim 15 recites the limitation "the distance D1" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 21 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Lines 5-6 of claim 1 recites "a correcting electrode having a curved surface to compensate for landing angle dependent distortions of the focusing electric field caused by the specimen" is vague and unclear. Is the focusing electric field caused by the specimen or by the first electrode? Also note that "landing angle dependent distortions of the focusing electric field" are interpreted to be of the first electrode and being "of" the first electrode cannot be caused by the specimen.

Lines 7-8 of claim 21 recites "a correcting electrode having a curved surface to compensate for landing angle dependent distortions of the focusing electric field caused by the specimen" is vague and unclear. Is the focusing electric field caused by the specimen or by the first electrode? Also note that "landing angle dependent distortions

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of the focusing electric field” are interpreted to be of the first electrode and being "of" the first electrode cannot be caused by the specimen.

Lines 5-6 of claim 36 recites “a correcting electrode having a cone-like shaped curved surface to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen” is vague and unclear. Is the focusing electric field caused by the specimen or by the first electrode? Also note that “landing angle dependent distortions of the focusing electric field” are interpreted to be of the first electrode and being "of" the first electrode cannot be caused by the specimen.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-25 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Petrov (US patent no. 6,897,442).

In regards to claim 1, Petrov teaches a focussing lens (fig. 1B, 100) for focussing a charged particle beam onto a specimen at a predetermined landing angle (col. 6, lines 63-67), comprising: at least a first electrode (fig. 1B, 14C) having a first aperture (fig. 1B, note aperture in 14C, which has a conical shape col. 4, lines 1-3) to generate a focussing electric field for focussing the charged particle beam onto the specimen (col. 6, lines 63-67); and a correcting electrode (fig. 1B, 16C', note: “16C' provides for better

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performance as compared to that of the lens arrangement of fig. 2" col. 9, lines 30-32, also note: "an appropriate voltage supply to the additional electrode 16C', the optical force of the entire lens arrangement can be regulated" col. 7, lines 24-30, i.e. 16C' acts as a correction electrode) having a curved surface (col. 6, lines 10-11) to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen (note: " to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen" is non-limiting subject matter see MPEP 2114 "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function").

In regards to claim 2, Petrov teaches wherein the curved surface is cone-like shaped (col. 6, lines 10-11).

In regards to claim 3, Petrov teaches wherein the curved surface of the correcting electrode has an opening on one side to provide space for the specimen to approach the first electrode (aperture in 16C' as seen in figure 1B).

In regards to claim 4, Petrov teaches wherein the curved surface of the correcting electrode is aligned to be rotationally symmetric with respect to a symmetry axis of the first aperture (fig. 1B, OA, 16C' and 14).

In regards to claims 5-7, Petrov teaches the correcting electrode encircling the aperture of the first electrode (fig. 1B, 16' and col. 6, lines 10-11).

In regards to claim 8, Petrov teaches wherein the curved surface of the correcting electrode is rigidly fastened to the at least first electrode (col. 7, lines 11-17).

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In regards to claim 9, Petrov teaches wherein the at least first electrode and the correcting electrode are electrically connected to different voltage sources to provide for different voltages (col. 5, lines 40-46 and col. 7, lines 24-30).

In regards to claim 10, Petrov teaches wherein the first electrode is cone-like shaped (col. 4, lines 1-3).

In regards to claim 11, Petrov teaches wherein the curved surface of the correcting electrode faces the first electrode conformally (as seen in figure 1B).

In regards to claim 12, Petrov teaches wherein a distance D1 between the at least one first electrode and the facing curved surface of the correcting electrode is smaller than 10 mm (col. 7, lines 55-60).

In regards to claim 13, Petrov teaches wherein the at least one first electrode and the correcting electrode are arranged to withstand a voltage of at least 500 V (note tables in col. 8)

In regards to claim 14, Petrov teaches wherein the curved surface of the correcting electrode is shaped and positioned to cover more than 20% of the cone-like shaped first electrode to electrostatically shield said cone-like shaped first electrode (fig. 1C, 26' note: col. 6, 20-35)

In regards to claim 15, Petrov teaches wherein the opening of the curved surface of the correcting electrode is large enough to accommodate the specimen closer to the at least one first electrode than the distance D1 between the first electrode and the curved surface of the correcting electrode (fig. 1C 14C and 26').

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In regards to claim 16 and 18, Petrov teaches wherein a rim of the opening in the curved surface of the correcting electrode defines essentially a parabola (although Petrov does not specifically teach a parabola shaped rim, discovering an optimum shape of a result effective variable involves only routine skill in the art).

In regards to claim 17, Petrov teaches wherein the specimen is a planar semiconductor wafer having a diameter larger than 30 mm preferably larger than 100 mm (col. 1, lines 14-16).

In regards to claim 19, Petrov teaches further comprising a coil for providing a focussing magnetic field for focussing the charged particle beam (col. 5, lines 40-41).

In regards to claim 20, Petrov teaches further comprising a second electrode having a second aperture for focussing the charged particle beam (fig. 1B, 16C).

In regards to claim 21, Petrov teaches a charged particle beam device to inspect or structure a specimen at various predetermined landing angles (fig. 1A), comprising: a charged particle beam source to generate a charged particle beam (col. 2, lines 52-59); and a focussing lens to focus the charged particle beam onto the specimen (fig. 1B, 100), the focussing lens comprises comprising at least a first electrode (fig. 1B, 14C) having a first aperture (fig. 1B, note aperture in 14C, which has a conical shape col. 4, lines 1-3) to generate a focussing electric field for focussing the charged particle beam onto the specimen (col. 6, lines 63-67) and a correcting electrode (fig. 1B, 16C', note: "16C' provides for better performance as compared to that of the lens arrangement of fig. 2" col. 9, lines 30-32, also note: "an appropriate voltage supply to the additional electrode 16C', the optical force of the entire lens arrangement can be regulated" col. 7,

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lines 24-30, i.e. 16C' acts as a correction electrode) having a curved surface (col. 6, lines 10-11) to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen (note: " to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen" is non-limiting subject matter see MPEP 2114 "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function").

In regards to claim 22, Petrov teaches further comprising a tilting mechanism to tilt a symmetry axis of the focussing lens with respect to the surface of the specimen for inspecting or structuring the specimen between at least two different landing angles (col. 5, lines 62-67).

In regards to claim 23, Petrov teaches wherein the tilting mechanism is capable of tilting the symmetry axis of the focussing lens to provide a vertical landing angle and a tilted landing angle which deviates from the vertical landing angle by at least 20 degrees (col. 5, lines 62-67).

In regards to claim 24, Petrov teaches wherein the tilting mechanism is capable of providing a tilted landing angle which is half the cone vertex angle of the cone-like shaped first electrode (col. 5, lines 59-61, best seen in figures 1A and 1B).

In regards to claim 25, Petrov teaches wherein the symmetry plane of the focussing lens is equal to or about equal to the tilting plane (col. 5, lines 59-61, best seen in figures 1A and 1B).

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In regards to claim 36, Petrov teaches a focussing lens (fig. 1B, 100) for focussing a charged particle beam onto a specimen at a predetermined landing angle (col. 6, lines 63-67), comprising: at least a first electrode (fig. 1B, 14C) having a first aperture (fig. 1B, note aperture in 14C, which has a conical shape col. 4, lines 1-3) to generate a focussing electric field for focussing the charged particle beam onto the specimen (col. 6, lines 63-67); and a correcting electrode (fig. 1B, 16C', note: "16C' provides for better performance as compared to that of the lens arrangement of fig. 2" col. 9, lines 30-32, also note: "an appropriate voltage supply to the additional electrode 16C', the optical force of the entire lens arrangement can be regulated" col. 7, lines 24-30, i.e. 16C' acts as a correction electrode) having a curved surface (col. 6, lines 10-11) to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen (note: "to compensate for landing angle dependent distortions of the focussing electric field caused by the specimen" is non-limiting subject matter see MPEP 2114 "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function"), wherein the cone-like shaped curved surface of the correcting electrode has an opening on one side to provide space for the specimen to approach the first electrode (aperture in 16C' as seen in figure 1B).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pertinent prior art is closely related art that individually or in

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combination could be considered grounds for rejection. See references cited for a listing of the pertinent prior art found and the prior art found.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL J. LOGIE whose telephone number is (571)270-1616. The examiner can normally be reached on 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 2881

/ROBERT KIM/
Supervisory Patent Examiner, Art Unit 2881